Network Troubleshooting

Accessing the WAN – Chapter 8

Objectives

- Establish a network baseline
- Describe troubleshooting methodologies and troubleshooting tools
- Describe the common issues that occur during WAN implementation
- Troubleshoot enterprise network implementation issues

Establish a Network Baseline

- Explain the importance of network documentation

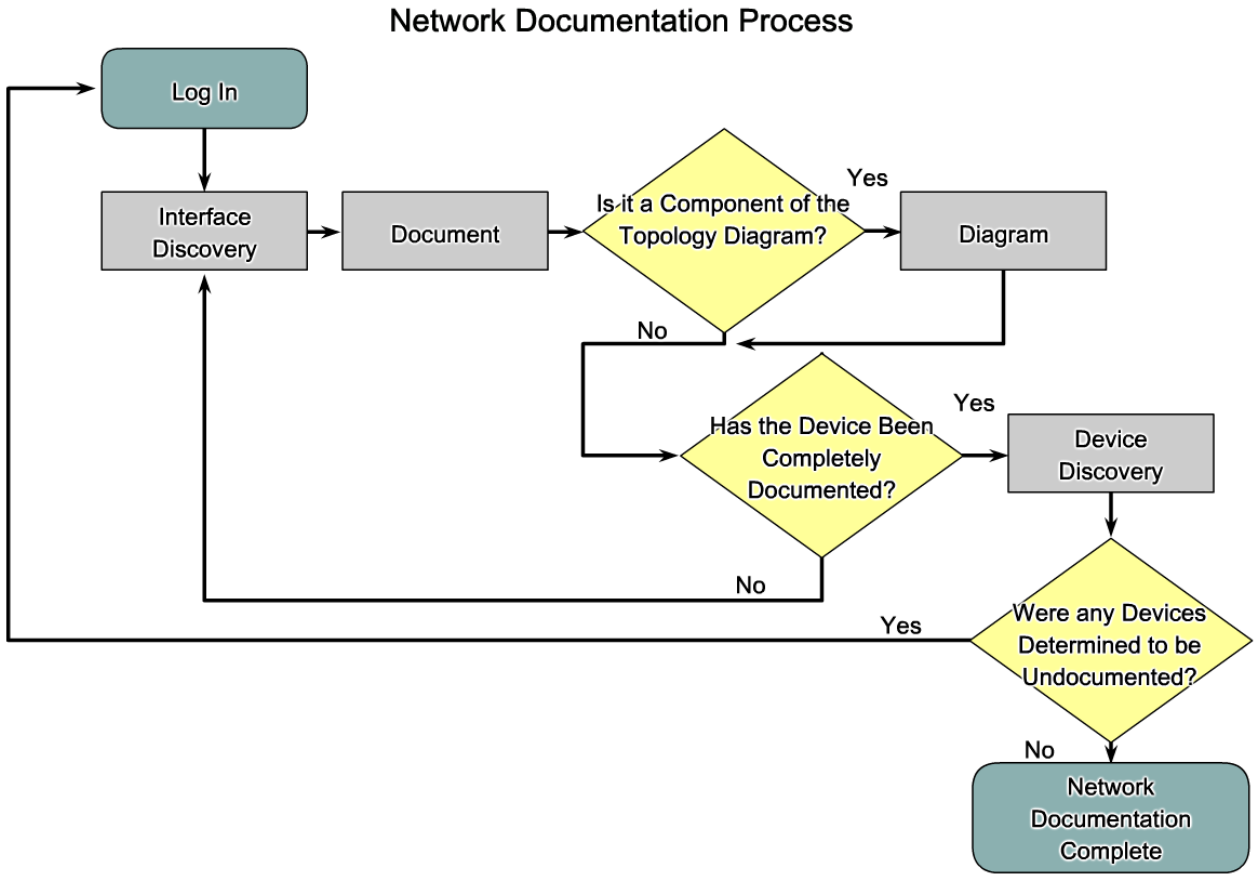
Documenting Your Network

Device Name, Model	Interface Name	MAC Address	IP Address/Subnet Mask	IP Routing Protocol(s)
R1, Cisco 2611XM	fa0/0	0007 .8580.a159	192.168.10.1 /24	EIGRP 10
	fa0/1	0007 .8580.a160	192.168.11.1 /24	EIGRP 10
	s0/0/0	--- ---	10.1.1.1/30	OSPF
	s0/0/1	--- ---	Not Connected	
R2, Cisco 2611XM	fa0/0	0007 .8580.a159	192.168.20.1 /24	EIGRP 10

Switch Name, Model, Management IP Address	Port Name	Speed	Duplex	STP State (Fwd / Block)	Port Fast (Yes / No)	Trunk Status	Ether Channel (L2 or L3)	VLANs	Key
S1, Cisco WS-C3550-24-SMI, 192.168.10.2 /24	fa0/1	100	Auto	Fwd	No	On	L2	1	Connects to R1
	fa0/2	100	Auto	Fwd	No	On	L2	1	Connects to PC1
	fa0/3								Not Connected
	fa0/4								Not Connected

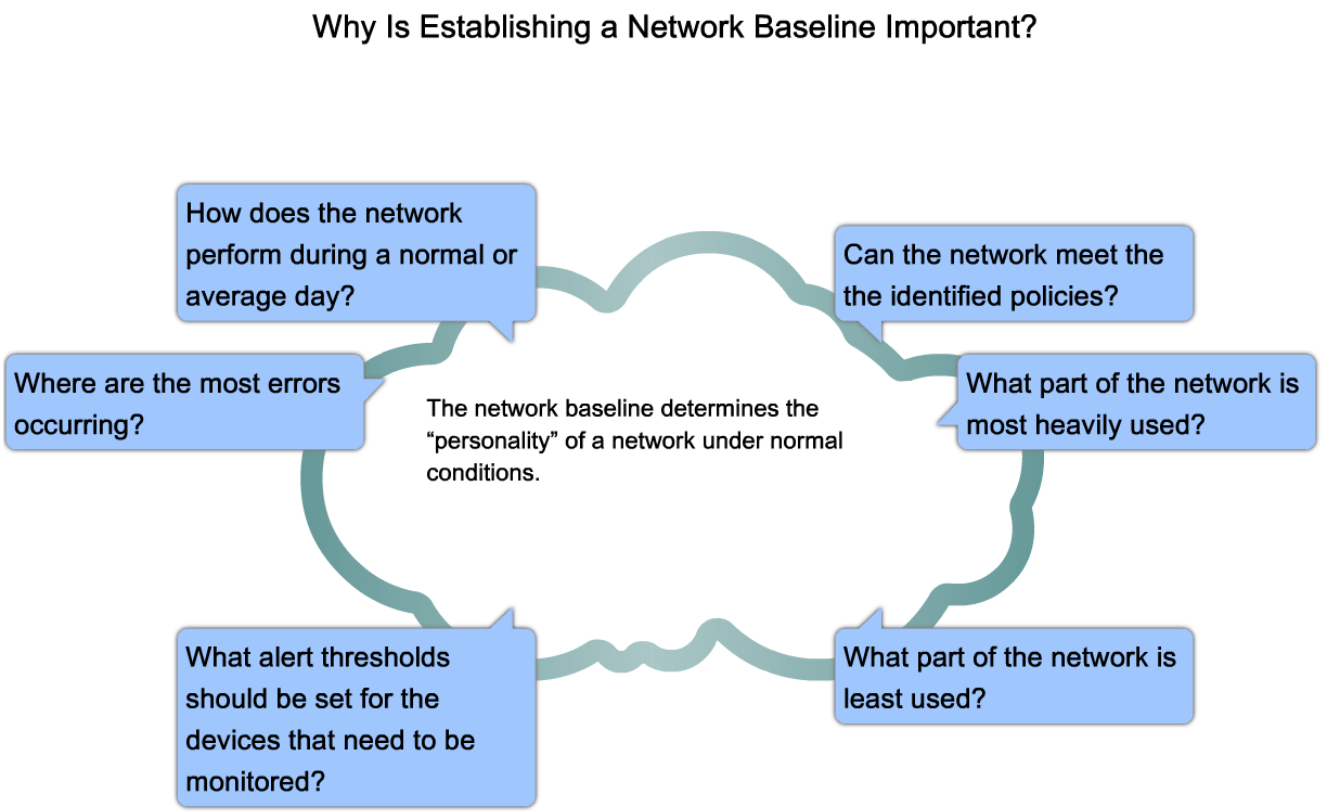
Establish a Network Baseline

- Describe the stages of the network documentation process



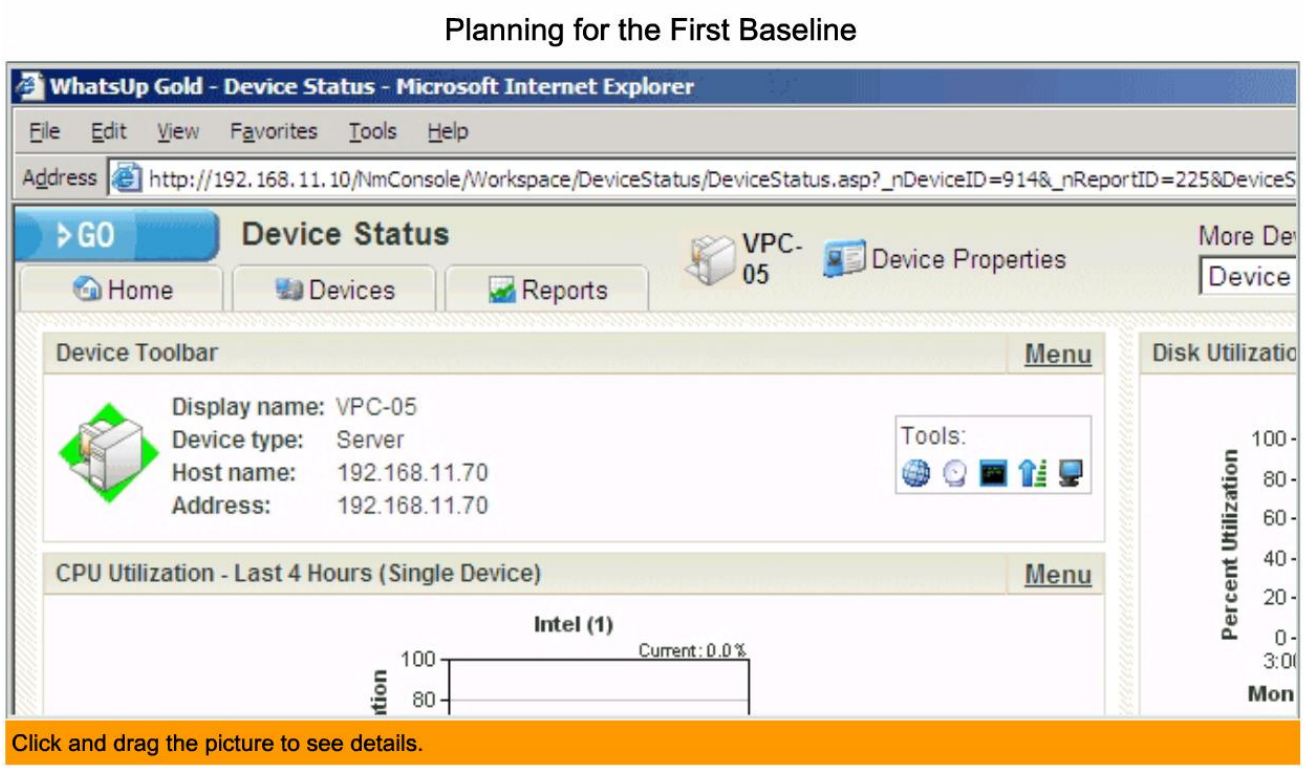
Establish a Network Baseline

- Explain the purpose for measuring normal network performance when creating a baseline



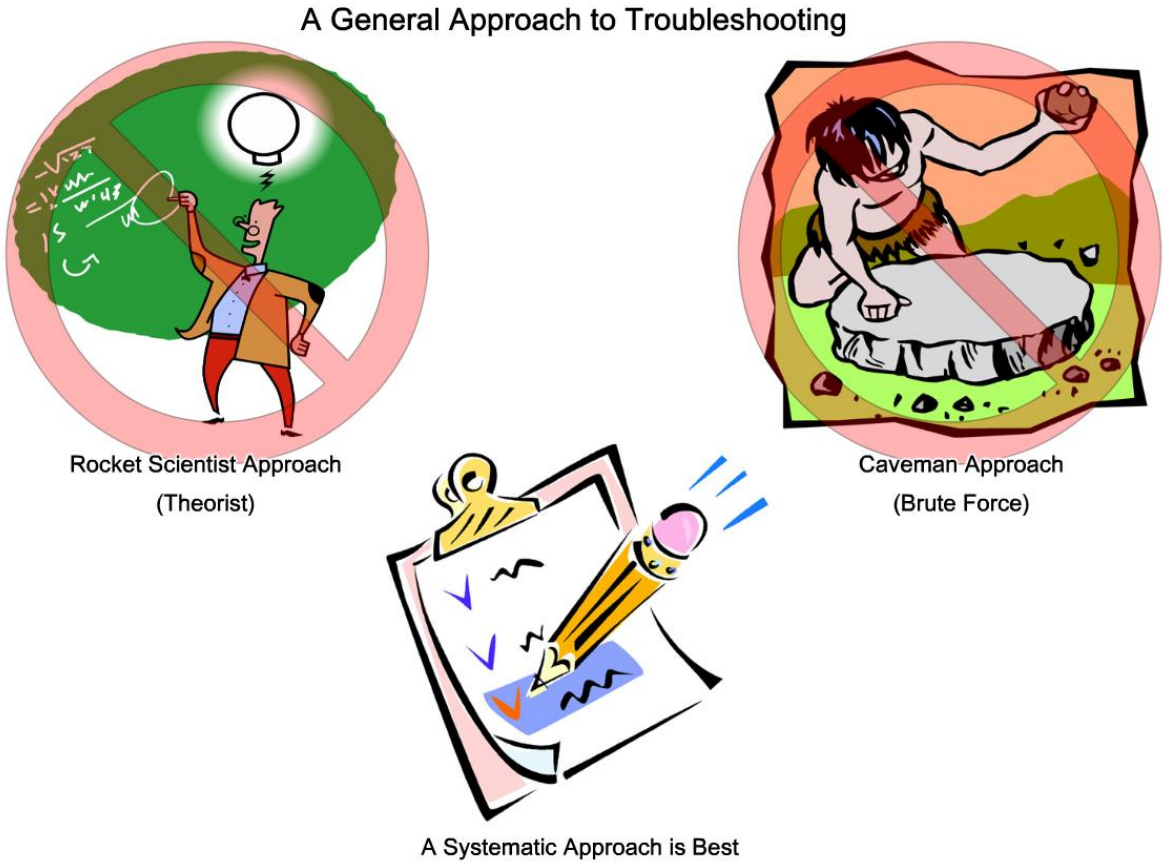
Establish a Network Baseline

- Describe the steps for establishing a network baseline



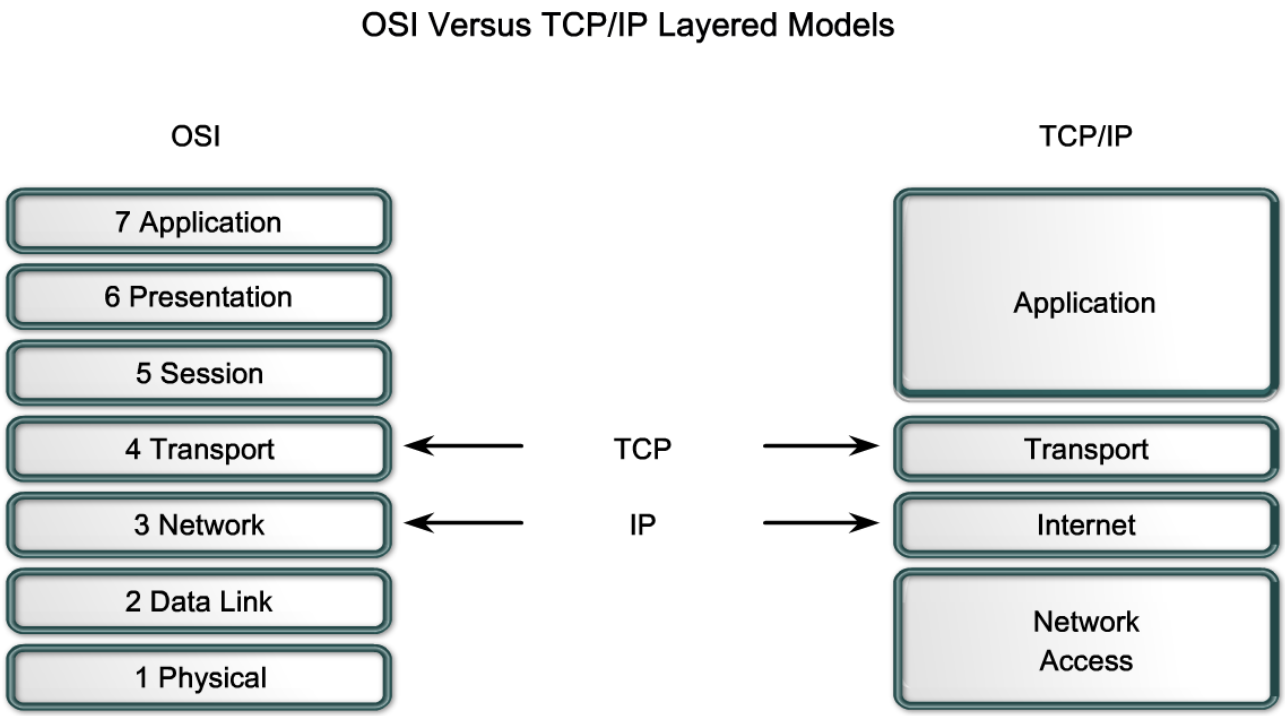
Describe Troubleshooting Methodologies and Troubleshooting Tools

- Explain why a systematic method is the generally the best approach to troubleshooting



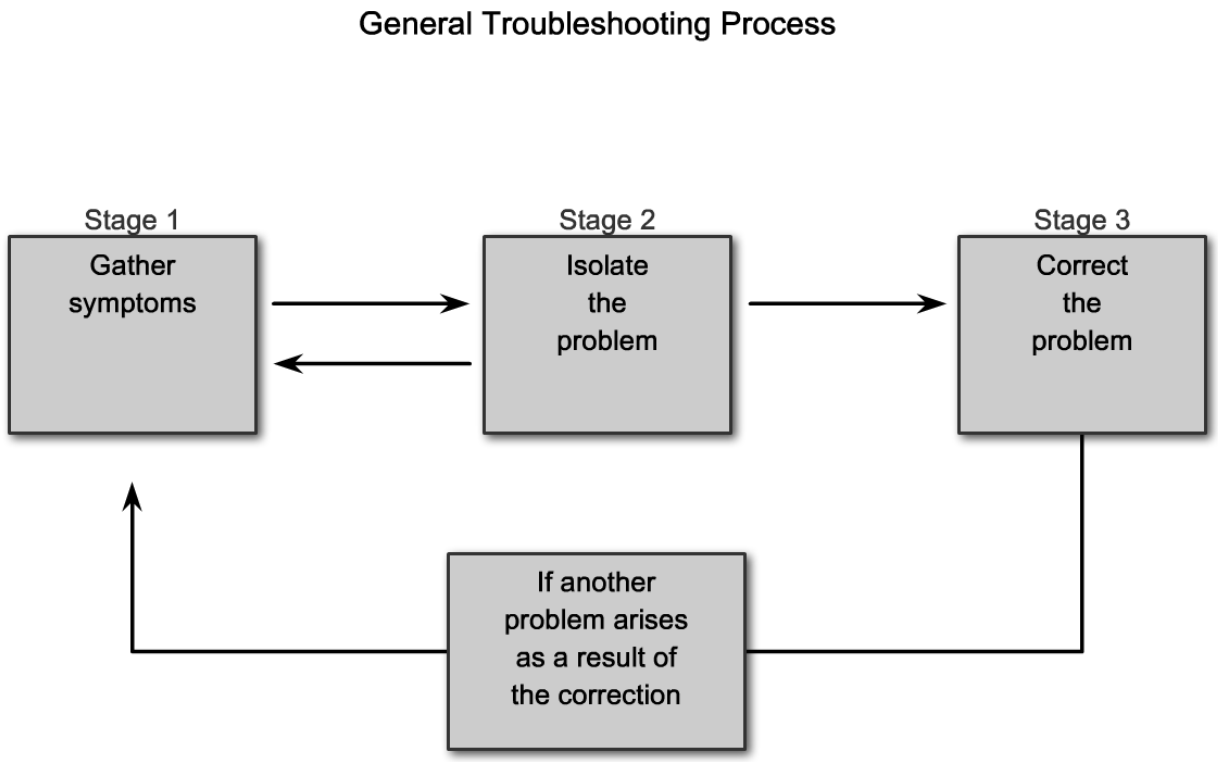
Describe Troubleshooting Methodologies and Troubleshooting Tools

- Describe how layered models, such as the OSI reference model or TCP/IP model, are used for troubleshooting



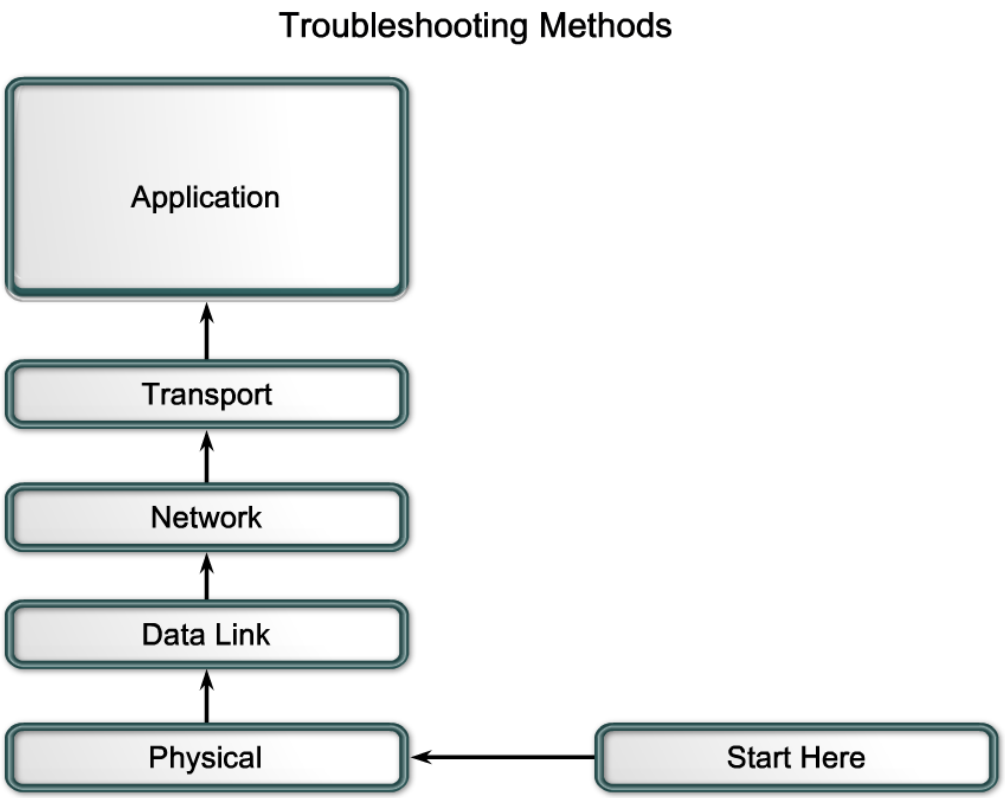
Describe Troubleshooting Methodologies and Troubleshooting Tools

- Describe the three stages of the general troubleshooting process



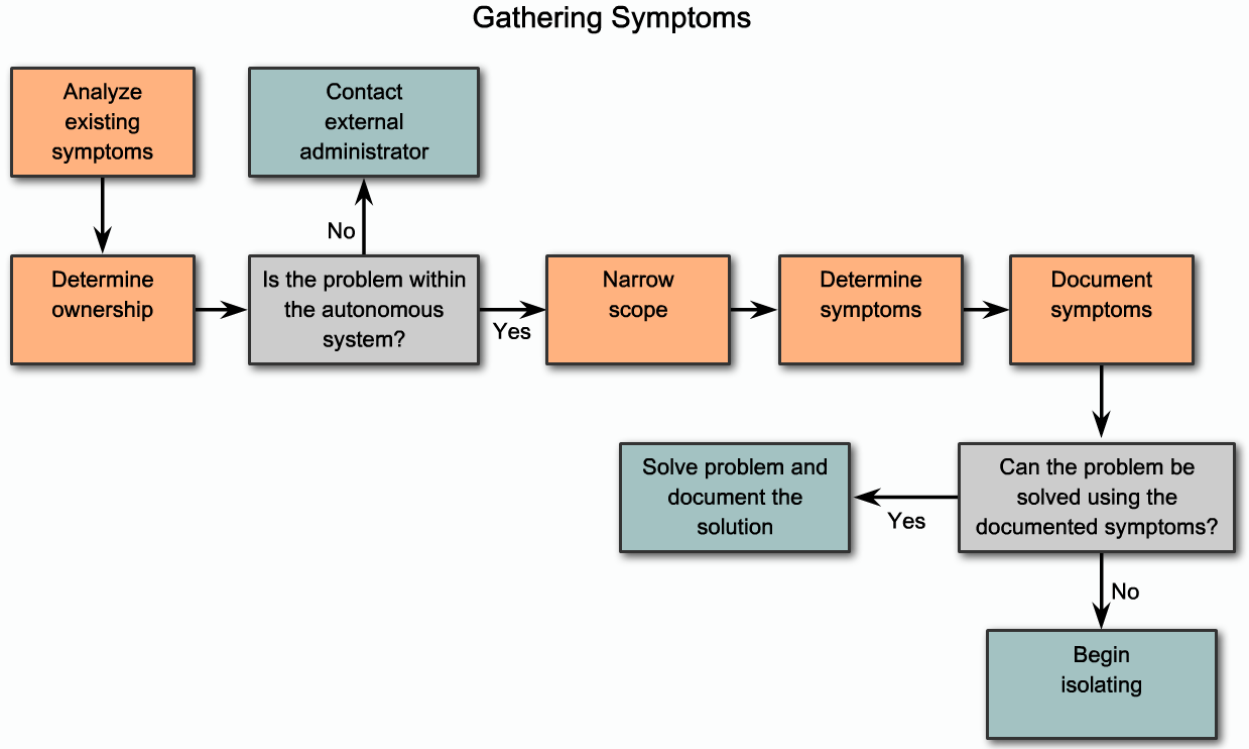
Describe Troubleshooting Methodologies and Troubleshooting Tools

- Describe the three main methods for troubleshooting network problems



Describe Troubleshooting Methodologies and Troubleshooting Tools

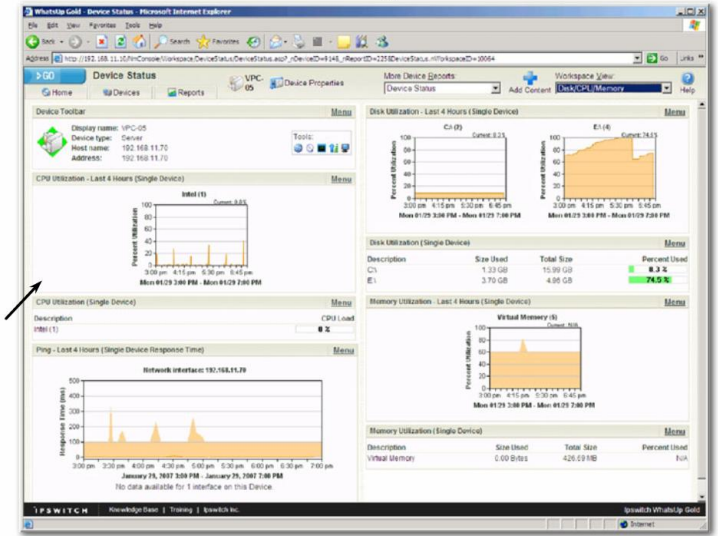
- Describe the stages for gathering symptoms for troubleshooting a network problem



Describe Troubleshooting Methodologies and Troubleshooting Tools

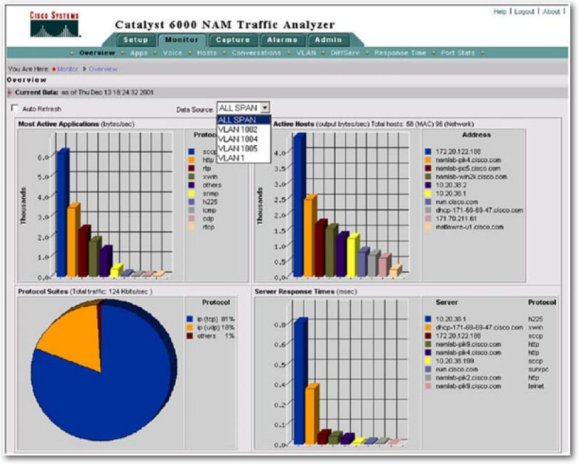
- Describe the types of software and hardware tools that are commonly used when troubleshooting networks

Software Troubleshooting Tools



WhatsUp Gold NMS Device Status display

Hardware Troubleshooting Tools

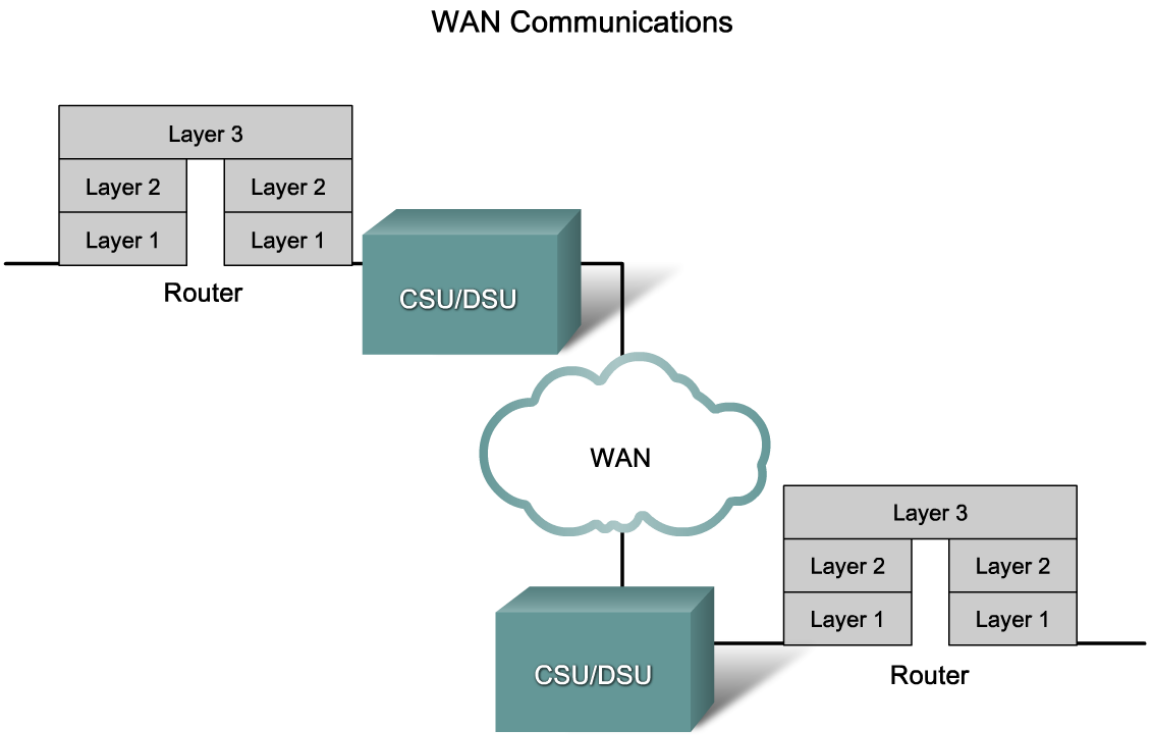


Web-based application displays NAM Traffic Analyzer Data

NAM module for a Catalyst 6500

Describe the Common Issues that Occur During WAN Implementation

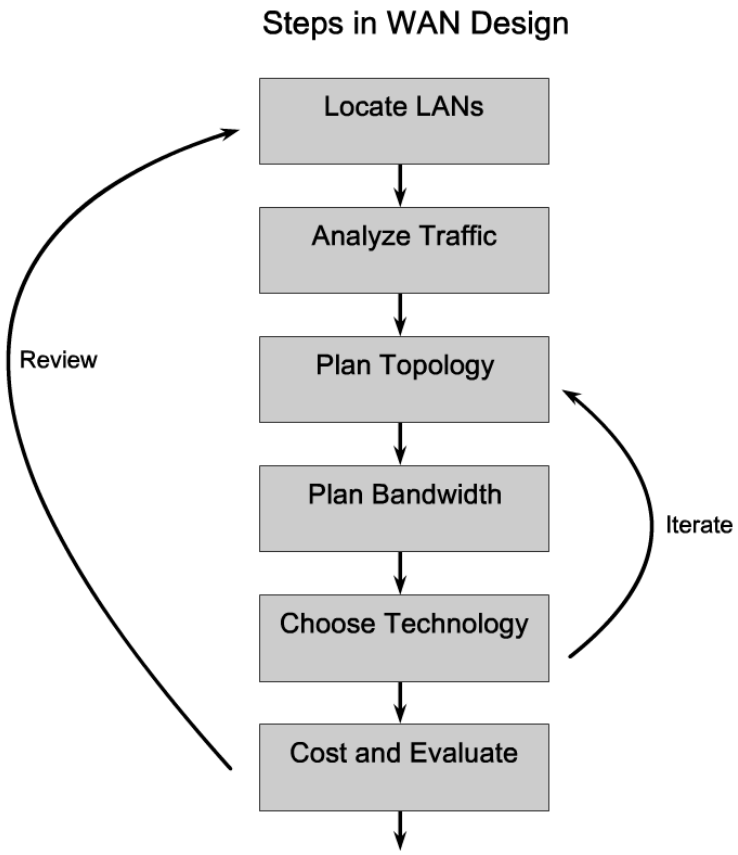
- Describe the fundamentals in WAN design and communication



WAN Technologies operate at the lower 3 layers of the OSI Model.

Describe the Common Issues that Occur During WAN Implementation

- Describe the steps for designing or modifying a WAN



Describe the Common Issues that Occur During WAN Implementation

- Describe the considerations for analyzing WAN traffic

WAN Traffic Considerations

Traffic Types

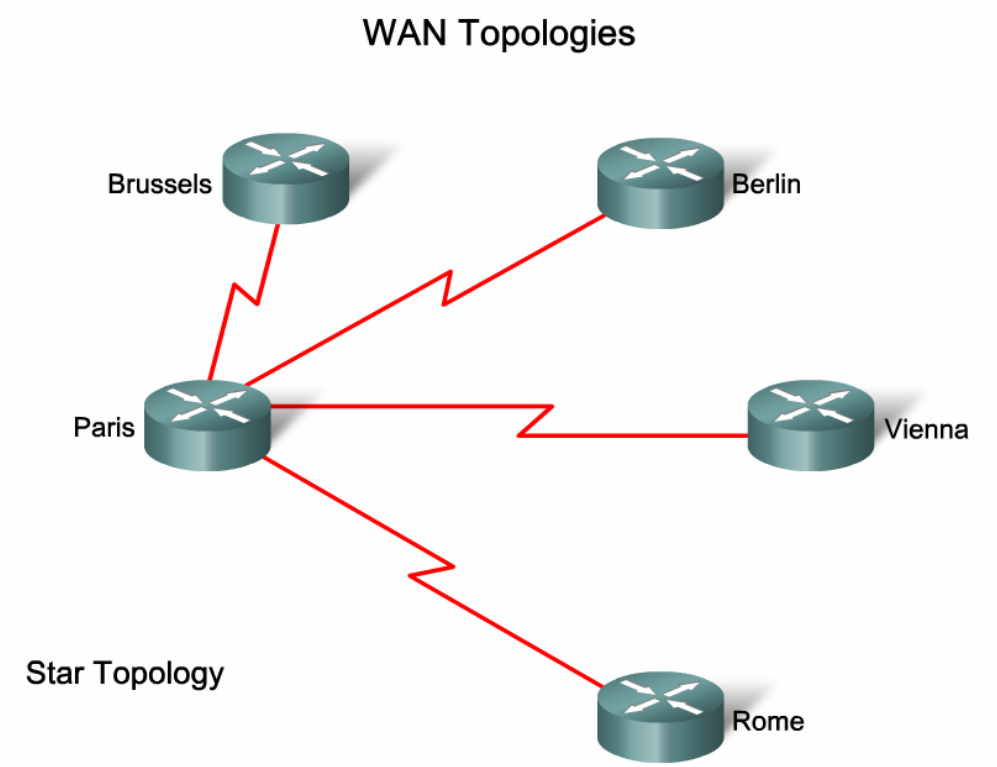
Traffic	Latency	Jitter	Bandwidth
Voice	Low	Low	Medium
Transaction data (for example, SNA)	Medium	Medium	Medium
Messaging (e-mail)	High	High	High
File transfer	High	High	High
Batch data	High	High	High
Network management	High	High	Low
Videoconferencing	Low	Low	High

Traffic Characteristics

Characteristic	Description
Connectivity and volume flows	Where does this traffic flow and how much traffic flows there?
Client/server data	What kind of traffic flows between the client and server?
Latency tolerance, including length and variability	Can the users tolerate delays? How much and how often?
Network availability tolerance	How critical is network availability to the users of this LAN? Can they tolerate WAN outages or would their work grind to a halt?
Error-rate tolerance	Is this noisy traffic?

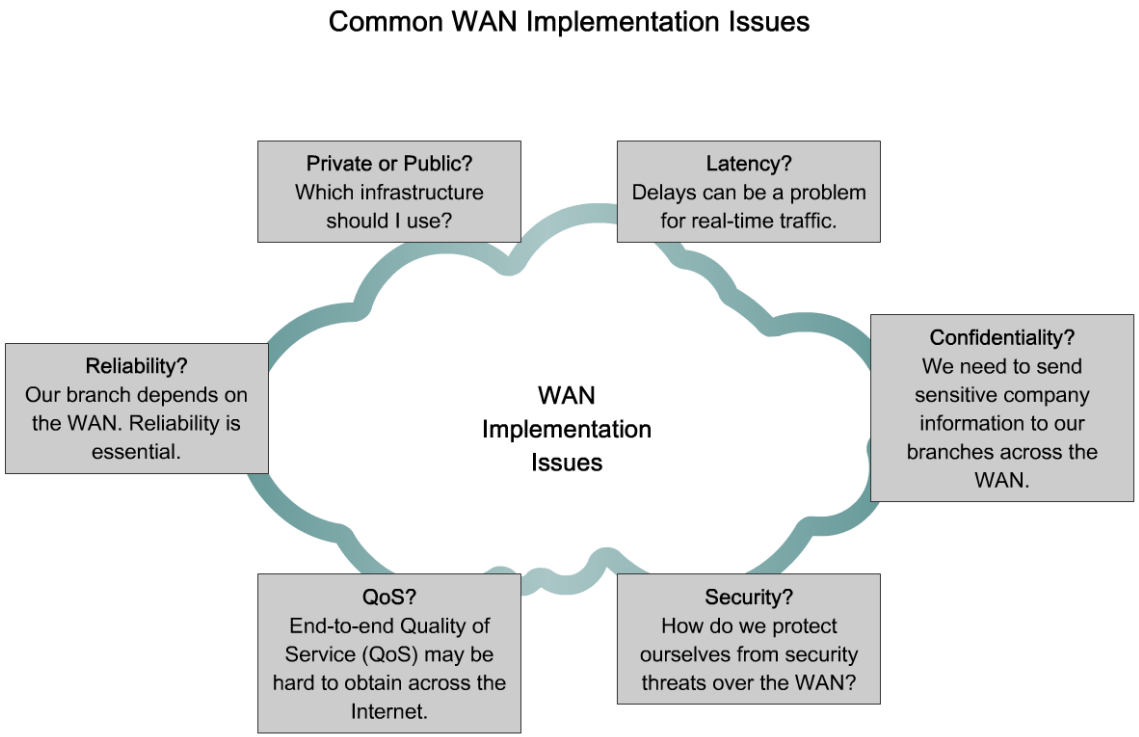
Describe the Common Issues that Occur During WAN Implementation

- Describe the considerations for designing a WAN topology



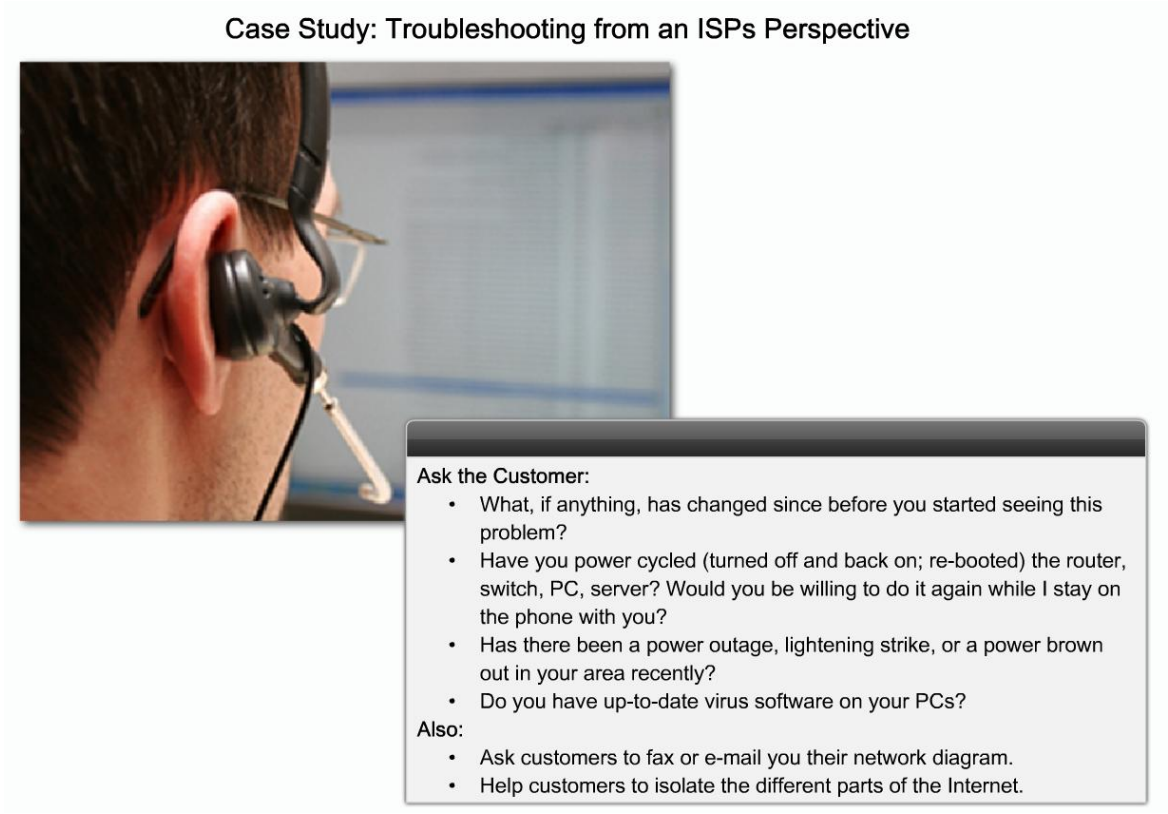
Describe the Common Issues that Occur During WAN Implementation

- Describe common WAN implementation issues



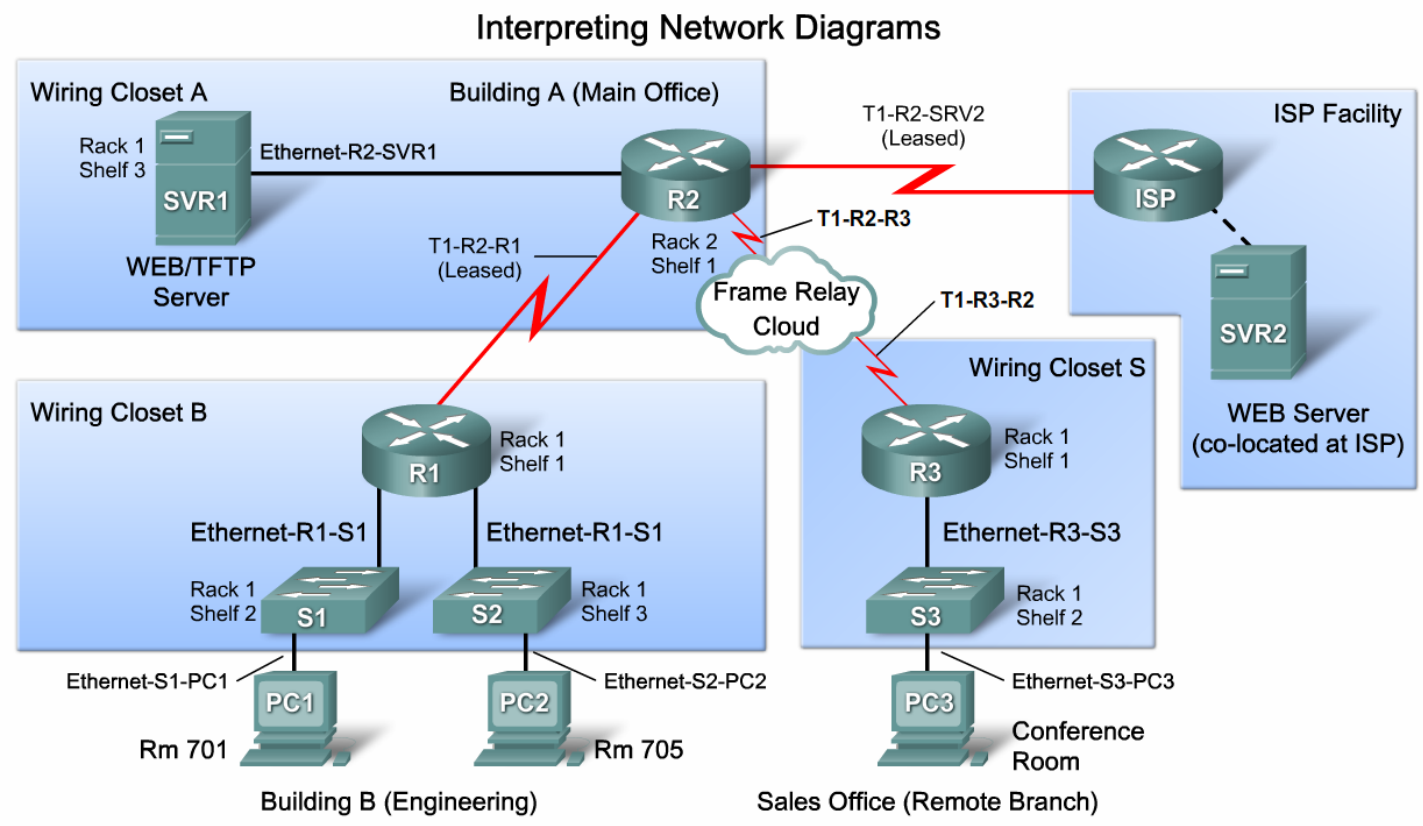
Describe the Common Issues that Occur During WAN Implementation

- Describe the recommended steps for troubleshooting a WAN



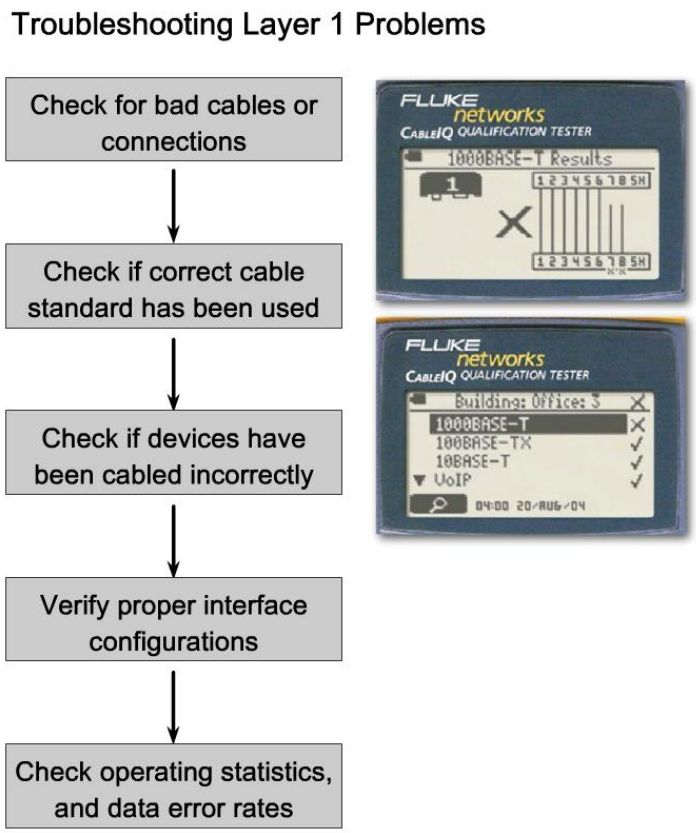
Troubleshoot Enterprise Network Implementation Issues

- Explain how network diagrams are used for troubleshooting



Troubleshoot Enterprise Network Implementation Issues

- Describe how to troubleshoot network problems occurring at the physical layer



Troubleshoot Enterprise Network Implementation Issues

- Describe how to troubleshoot network problems occurring at the data link layer

Troubleshooting Layer 2 (PPP)

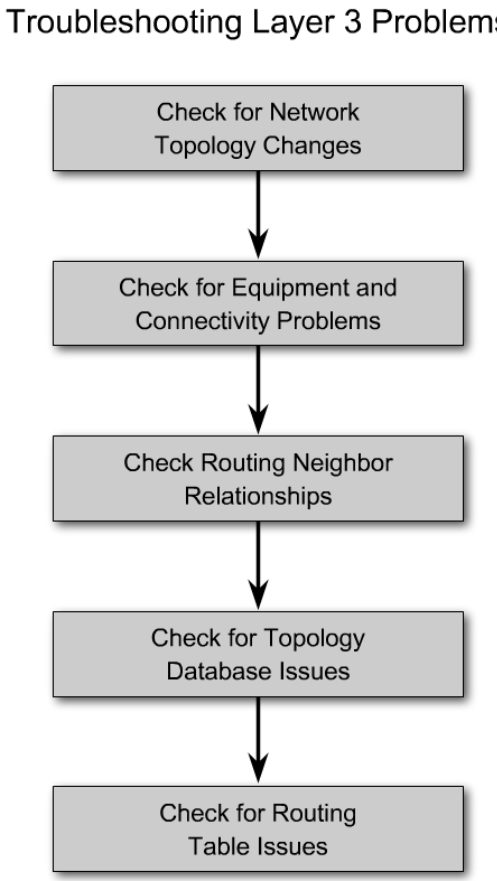
Problem: R2 encapsulation was incorrectly configured as HDLC

```
R2#show interfaces serial 0/0/0
Serial0/0/0 is up, line protocol is up
  Hardware is GT96K Serial
  Internet address is 10.1.1.2/30
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, loopback not set
  . . .
```

Step 1: Check that the appropriate encapsulation is in use at both ends.

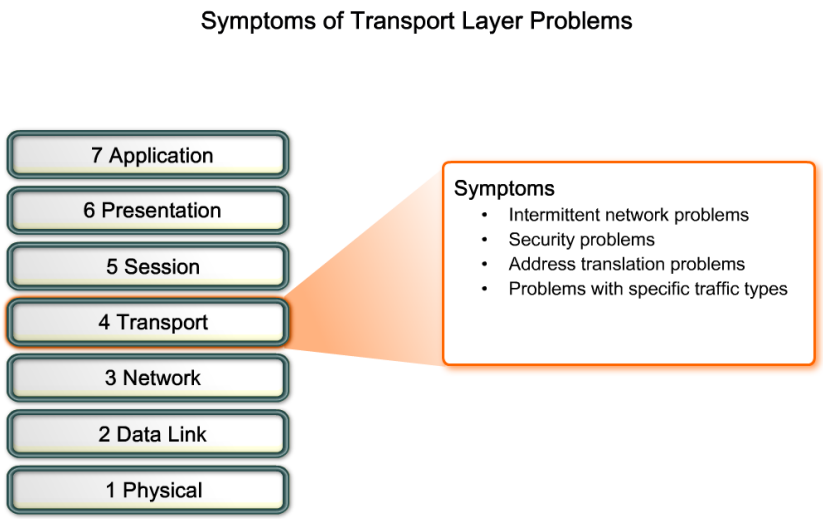
Troubleshoot Enterprise Network Implementation Issues

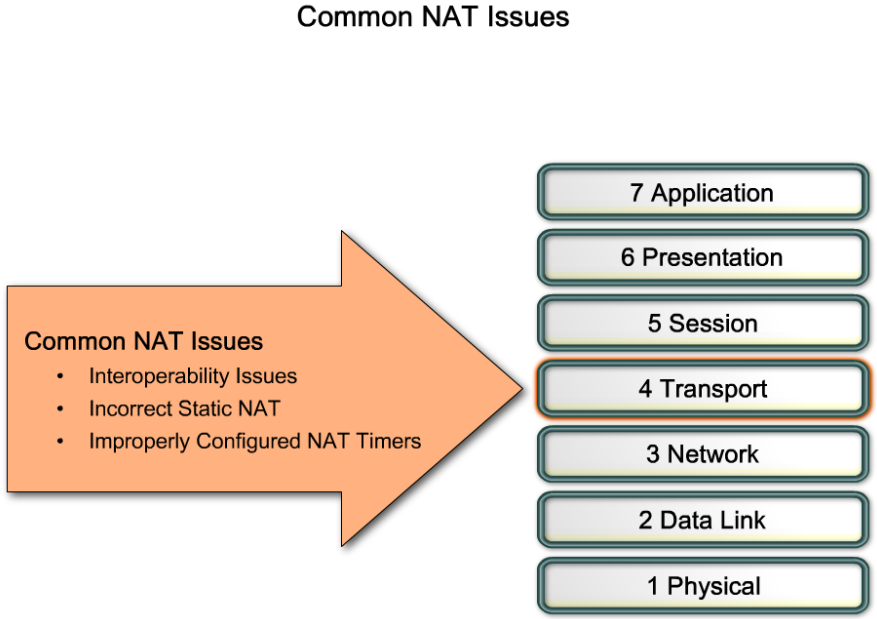
- Describe how to troubleshoot network problems occurring at the network layer



Troubleshoot Enterprise Network Implementation Issues

- Describe how to troubleshoot network problems occurring at the transport layer

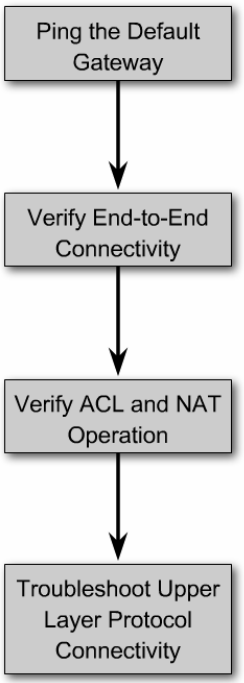




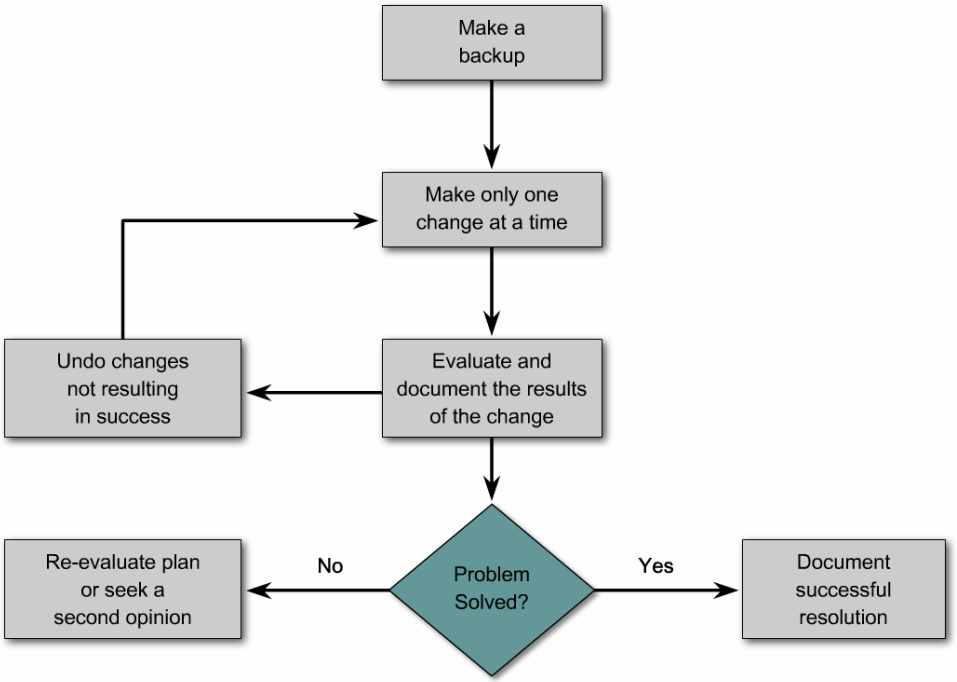
Troubleshoot Enterprise Network Implementation Issues

- Describe how to troubleshoot network problems occurring in the application layers

Troubleshooting Application Layer Problems



Correcting Application Layer Problems



Summary

- Network Baseline

  How a network is expected to perform under normal conditions

- Network documentation should include:
  - Network configuration table
  - End-system configuration table
  - Network topology diagram
- Planning for the 1st baseline
  - Determine what type of data to collect
  - Identify devices and ports of interest
  - Determine baseline duration

Summary

- 3 stages of the troubleshooting process
  - –Gather symptoms
  - –Isolate problem
  - –Correct problem
- 3 main methods for troubleshooting a network
  - –Bottom up
  - –Top down
  - –Divide & conquer

Summary

- Software troubleshooting tools
  - –Cisco view
  - –Solar winds
  - –HP Open view
- Hardware troubleshooting tools
  - –Network analysis mode
  - –Digital multi-meters
  - –Cable testers
  - –Network analyzer

Summary

- Common WAN implementation issues include
  - –QoS
  - –Reliability
  - –Security
  - –Latency
  - –Confidentiality
  - –Public or Private
- Using a layered approach to troubleshooting aids in isolating and solving the problem